TEKSCAN PRESSURE MEASUREMENT ACCURACY FOR ORTHOPAEDIC BIOMECHANICAL JOINT CONTACT MEASUREMENTS

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Multi-axial test rig properties

Compression testing

Biaxial testing

Adjustable degrees of freedom of specimens

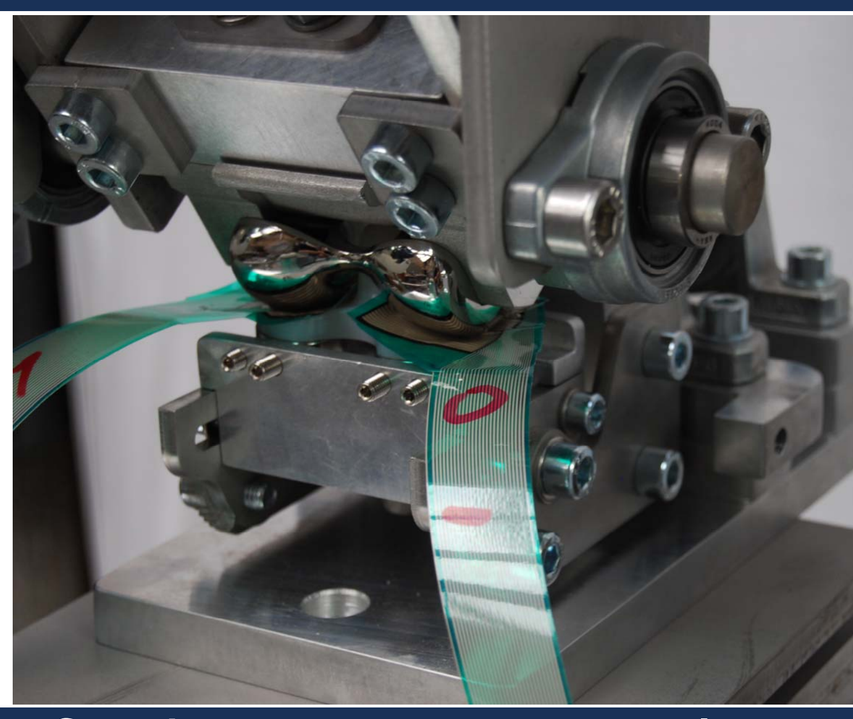
Knee implant mounting

Multi-axial test rig capabilities

Research of the Tekscan sensor characteristics

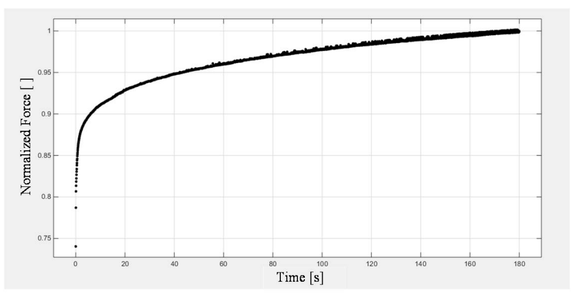
Tekscan sensor automated calibration

Evaluation of knee implants: pressure distribution measurement and stability research



Aim of this study: Improve the accuracy and reliability of Tekscan intra-articular contact pressure measurements

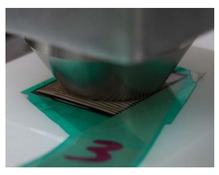
Sensor accuracy optimization technique



Automated sensor preconditioning and characterization

Preconditioning cycle improves the sensor output stability

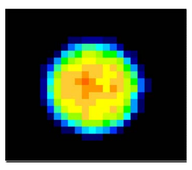
Characterization of the sensor's step response allows for sensor drift compensating post-processing



Automated multipoint calibration

Optimal contacting surfaces

Fully automated and synchronized process

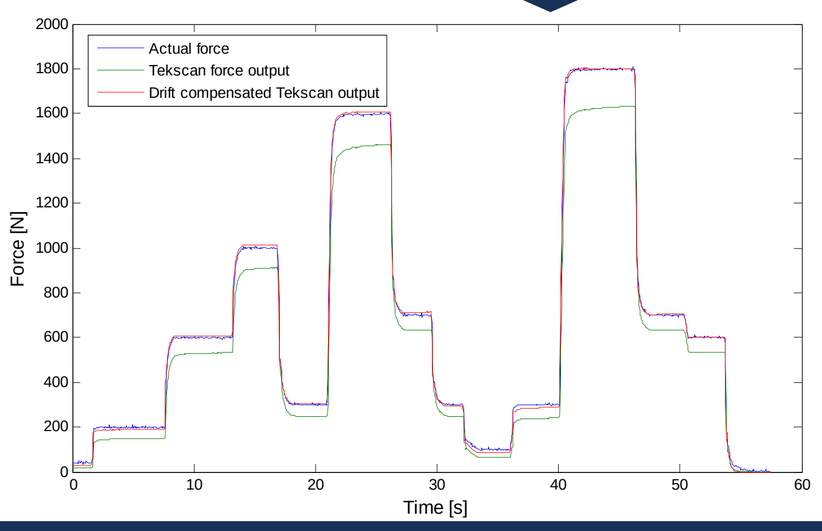


Contact pressure measurements

MATLAB

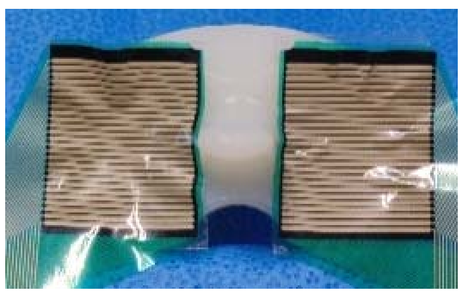
Automated measurement data post-processing

Based on sensor specific behaviour and calibration data, sensor drift is eliminated during post-processing

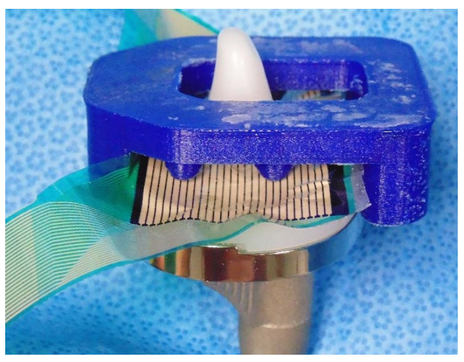


Drift compensation technique reduces average error during realistic loading from 15,6 % to 3,4 %

Sensor position measurement method

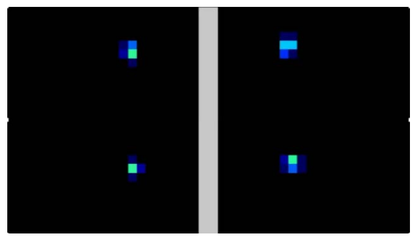


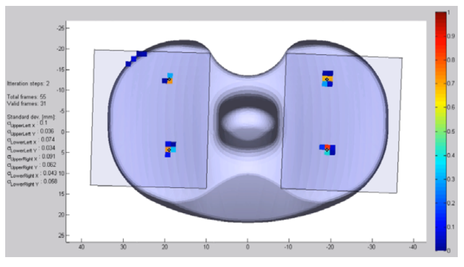
Sensor fixation to the implant



Measurement method

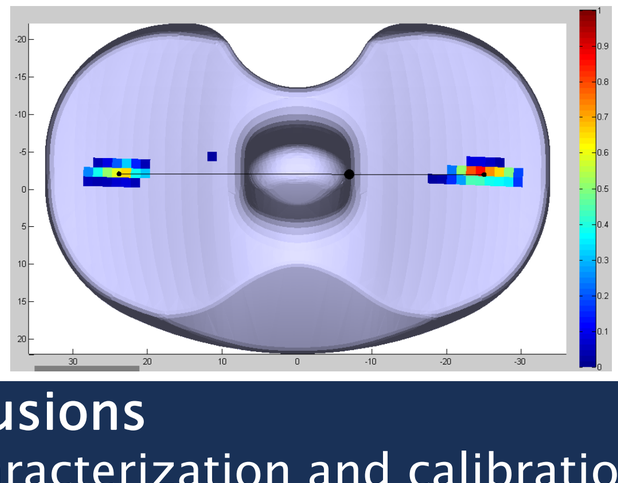
Implant specific 3D printed calibration block





Sensor position computation

Automated sensor position computation and visualization



Pressure distribution visualisation

Computation and visualization centres of pressure

Animated and synchronized visualization

Easy interpretation

Conclusions

Optimized sensor preconditioning, sensor specific characterization and calibration combined with advanced data post-processing results in a 5 times higher measurement accuracy.

Sensor position measurement allows for intuitive visualization and interpretation of measurement data.

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